UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

SONRAI MEMORY LIMITED, Plaintiff, v. KIOXIA CORPORATION, KIOXIA AMERICA, INC., Defendants.	Case No. 6:21-cv-00400-ADA
SONRAI MEMORY LIMITED, Plaintiff, v. DELL TECHNOLOGIES INC., Defendant.	Case No. 6:21-cv-00361-ADA
SONRAI MEMORY LIMITED, Plaintiff, v. APPLE INC., Defendant.	Case No. 6:21-cv-00401-ADA
SONRAI MEMORY LIMITED, Plaintiff, v. GOOGLE LLC, Defendant.	Case No. 6:21-cv-00167-ADA

SONRAI MEMORY LIMITED, Plaintiff, v. LG ELECTRONICS INC., LG ELECTRONICS U.S.A., INC., Defendants.	Case No. 6:21-cv-00168-ADA
SONRAI MEMORY LIMITED, Plaintiff, v. SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC., Defendants.	Case No. 6:21-cv-00169-ADA
SONRAI MEMORY LIMITED, Plaintiff, v. WESTERN DIGITAL TECHNOLOGIES, INC. Defendants.	Case No. 6:21-cv-01168-ADA

DEFENDANTS' OPENING CLAIM CONSTRUCTION BRIEF

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I. INTRODUCTION

Defendants Dell Technologies Inc., Kioxia Corporation, Kioxia America, Inc., Apple Inc., Google LLC, LG Electronics Inc., LG Electronics U.S.A., Inc., Samsung Electronics Co. Ltd., Samsung Electronics America Inc., and Western Digital Technologies, Inc. ("Defendants") hereby present their proposed claim constructions for the disputed terms as to U.S. Patent Nos. 6,724,241 (the "'241 patent"), 6,874,014 (the "'014 patent"), 6,920,527 (the "'527 patent"), and 7,436,232 (the "'232 patent").[1]

II. AGREED-UPON CONSTRUCTIONS

The parties have agreed upon the following constructions:

Term	Agreed-Upon Construction
"coupled to each load" ('241 patent, claim 6)	"coupled to each corresponding load"
"each load selector means" ('241 patent, claim 7)	The "load selector means"
"multiple operating systems residing in a memory" ('014 patent, claims 1, 7)	"multiple operating systems residing in the same memory"
"multiple processors are connected to said memory via a bus" ('014 patent, claim 3)	"multiple processors are connected to said memory via the same bus"

III. THE DISPUTED TERMS OF U.S. PATENT NO. 6,724,241

A. Overview of the '241 Patent

Charge pumps were well-known devices in the prior art to generate voltages higher than the voltage of the available power source. '241 patent[2], 1:15-17. It was a known problem that charge pumps sometimes generate an output voltage containing a ***voltage ripple*** due to excess

[1] Each defendant is joining in this brief only as to the patent(s) asserted against it. The patents are submitted as Exs. 1-4.

[2] The '241 patent is submitted as Ex. 1.

charge generated by the charge pump that is dumped into the load capacitance (e.g., a memory device) being driven by the charge pump. *Id.*, 2:3-15, Fig. 2A. As the '241 patent admits, there were known techniques for minimizing voltage ripple. *Id.*, 2:46-67. The '241 patent is directed to a particular type of charge pump for minimizing the voltage ripple. *Id.*, Abstract, Figs. 3, 7.

The '241 patent purports to minimize charge pump voltage ripple through selectively coupling, to the charge pump output, an additional load "***associated***" with a specific pump voltage ***when that specific pump voltage is selected***. *Id.*, 4:33-51, claim 1. In addition, the '241 patent discusses shutting down the charge pump when conditions are met, and adding yet another load "whenever the maximum acceptable ripple on target output sampled" is greater than a reference voltage. *Id.*, 6:8-17, 7:7-16, 7:31-42, claim 2-3.

Annotated Figure 7 below illustrates the purported invention, comprising three blocks connected to the "PUMP." *Id.*, 5:54-6:17. The first block, highlighted in red and labeled "Block 1," contains selectable loads, each associated with a particular voltage level and selectively attached to the output terminal. *Id.*, 4:33-5:21. The second block, highlighted in purple and labeled "Block 2," shuts off the charge pump if the measured voltage Vcfra exceeds a reference voltage Vref. *Id.*, 6:9-17. The third block, highlighted in green and labeled "Block 3," adds another load (i.e., Load S) if the measured voltage Vcfrb exceeds an acceptable voltage level. *Id.*, 6:4-8.

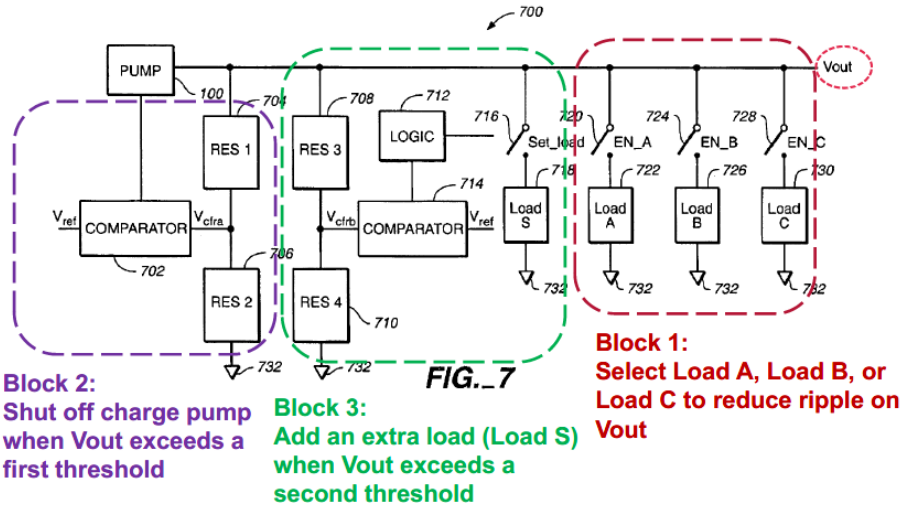


FIG._7

B. Level of Ordinary Skill in the Art for the '241 Patent

A POSITA as of the filing date of the '241 patent would have had a bachelor's degree in electrical engineering or an equivalent field and two years of academic or industry experience working with analog and digital circuits. *See* Decl. of Vivek Subramanian, Ph.D., in Support of Defendants' Opening Cl. Construction Br. ("Subramanian Decl."), ¶ 26.

C. "A charge pump circuit for generating a charge pump voltage having minimal voltage ripples" (claim 1)

Defendants' Proposed Construction	Sonrai's Proposed Construction
The preamble is limiting and should be given its plain and ordinary meaning.	The preamble is limiting, but only with regard to "charge pump circuit" and not "for generating a charge pump voltage having minimal voltage ripples."

The preamble of a claim is limiting when it provides antecedent basis to the body of the claim, recites structure that is essential or underscored as important by the specification, and/or breathes life, meaning and vitality into the claimed invention. *See Proveris Sci. Corp. v. Innovasystems, Inc.*, 739 F.3d 1367, 1372-73 (Fed. Cir. 2014); *Catalina Mktg. Int'l v. Coolsavings.com, Inc.,* 289 F. 3d 801, 808-809 (Fed. Cir. 2002); *see also Vizio, Inc. v. Int'l Trade Comm'n*, 605 F.3d 1330, 1340-41 (Fed. Cir. 2010) (finding a preamble reciting an "[a]pparatus for decoding a datastream of MPEG" limiting because "'decoding' [was] the essence or a fundamental characteristic of the claimed invention"). Here, the preamble of claim 1 does all three and should be found limiting. Subramanian Decl., ¶¶ 28-30.

The '241 patent is directed to a charge pump circuit for minimizing voltage ripples, much like the apparatus in *Vizio* that was directed to "decoding" MPEGs. *See* '241 patent, 3:1-2 ("An object of the invention is to provide a charge pump circuit with a ***minimum-ripple pump output Voltage***."); *id.*, 2:3-67 (criticizing the prior art charge pumps as not solving the "very critical" "ripple phenomenon"); *id.*, Abstract (describing "a variable charge pump … to ***minimize*** the

voltage ripples."); *see also* 2003-12-19 Notice of Allowance ("The Prior Art of record does not appear to disclose a charge pump with … a selectable load wherein a load is selected so as to ***minimize output ripple*** for a given output voltage."). The preamble must limit because it captures the essence of the alleged invention which is that the collection of claimed structures form a charge pump circuit that minimizes voltage ripples. Subramanian Decl., ¶ 30. Therefore, the preamble is limiting because it breathes life, meaning and vitality into the claim limitations by explaining the intended objective for the claimed plurality of loads and structurally limits the invention to a charge pump circuit. *See Vizio*, 605 F.3d at 1341 (preamble limiting because the claimed structure "would have little meaning without the intended objective of decoding").

Sonrai concedes that "[a] charge pump circuit," which provides antecedent basis to claim 2, is limiting, but tries to improperly parse the preamble into limiting and non-limiting sections. *Bio-Rad Lab'ys, Inc. v. 10X Genomics Inc.*, 967 F.3d 1353, 1371 (Fed. Cir. 2020) (reversing the district court's conclusion that only part of a preamble was limiting because "the preamble in this case cannot be neatly packaged into two separate portions. Nor does it simply recite a method for an intended use or purpose."); *SIMO Holdings Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1376 (Fed. Cir. 2021) (declining to find part of the preamble non-limiting where "the disputed language does not merely identify an intended use or functional property but is intertwined with the rest of the preamble [] and supplies structure noted in the specification as among the inventive advances."). As explained above, the "minimize output ripple" language is not merely an intended use, but is the crux of the invention and is intertwined with the rest of the preamble such that the preamble is limiting in its entirety.

D. "load" (claim 1)

Defendants' Proposed Construction	Sonrai's Proposed Construction
"a device that absorbs surplus charge to significantly reduce voltage ripple compared to a case without the device"	Plain and ordinary meaning.

Contrary to Sonrai's assertion that "load" should be given its plain and ordinary meaning, the '241 patent uses the term "load" in a particular way to refer to loads designed to minimize ripples at the output of the charge pump. The Court should thus construe the term to capture the special meaning given to it by the patent. *See Wi-LAN USA, Inc. v. Apple Inc.*, 830 F.3d 1374, 1382 (Fed. Cir. 2016) ("Consistent use of a term in a particular way in the specification can inform the proper construction of that term."); *AstraZeneca LP v. Apotex, Inc.*, 633 F.3d 1042, 1052 (Fed. Cir. 2010) (holding that "the inventor's lexicography governs" when "a patentee uses a claim term throughout the entire patent specification, in a manner consistent with only a single meaning, [such that] he has defined that term 'by implication.'").

The title of the '241 patent itself is telling: "Variable Charge Pump Circuit With Dynamic Load." '241 patent, Title. The Abstract describes the special type of load required: "A variable charge pump circuit uses a plurality of selectable ***loads to minimize the voltage ripples*** of the pumped output by selecting the ***appropriate load*** for a preselected pump voltage." *Id.*, Abstract (emphasis added). The specification further states: "An object of the invention is to provide a charge pump circuit ***with a minimum-ripple pump output voltage*** and at the same time maintain the basic structure of charge pump and of regulator…. ***The object is met by a charge pump circuit with variable load***." *Id.*, 3:1-8 (emphasis added).

Later, the specification describes the specific characteristics of the load: "Depending on the desired pump output V_{out}, the switches select an appropriate load associated with a specific pump voltage to result in a minimum voltage ripple." *Id.*, 4:5-8. The specification further

explains: "There is minimal ripple because the load is matched with the load capacitor 322 of the pumping circuit." *Id.*, 4:64-65. The specification emphasizes that the load ***significantly*** reduces voltage ripple. *Id.*, 5:6-11 ("In contrast to the graph 2B of FIG. 2, the Voltage ripple of the charge pump output in this case is at minimum because the charge dumped into the load capacitance is ***significantly reduced*** because the load provided by load B makes the load of the pump matched to the internal pumping capacitor.") (emphasis added); 5:17-21 ("The voltage ripple of the charge pump output in this case is also at minimum because the charge dumped into the load capacitance is ***significantly reduced*** because the load capacitance and the internal capacitance are matched.") (emphasis added).

Thus, the load of the '241 is a specific structure that performs a specific function that is critical to the claimed invention and should be construed as such.

E. "a load selector means for selectively coupling a load associated with a specific pump voltage to the output of said pumping circuit" (claim 1)

Defendants' Proposed Construction	Sonrai's Proposed Construction
This is a means-plus-function limitation. Function: "selectively coupling a load associated with a specific pump voltage to the output of said pumping circuit," which means "choosing a load based on the target pump voltage, such that the load is coupled to the output of the pumping circuit when the target pump voltage is selected" Corresponding structure: the three switches 320, 324, and 328 together with their respective control signals EN_A, EN_B, and EN_C and the controller that generates those signals	Plain and ordinary meaning; not subject to § 112 ¶ 6. Alternatively, should § 112 ¶ 6 apply: Function: selectively coupling a load associated with a specific pump voltage to the output of said pumping circuit Corresponding structure: Switches 320, 324, 328 and associated signals EN_A, EN_B, EN_C, as shown in figures 3, 5A, 5B, and switches 716, 720, 724, 728 and associated signals Set_load, EN_A, EN_B, EN_C, as shown in Figure 7, as well as associated descriptions of each in the specification.

The term "load selector means" should be construed as a means-plus-function limitation, as the word "means" creates a presumption that 35 U.S.C. § 112, ¶ 6 applies. *See Personalized*

Media Commc'ns, LLC v. International Trade Comm'n, 161 F.3d 696, 703–04 (Fed. Cir. 1998). It has no plain and ordinary meaning.

1. Construction of the Function

Sonrai concedes that if the Court agrees with Defendants that this is a means-plus-function limitation, then the recited function is "selectively coupling a load associated with a specific pump voltage to the output of said pumping circuit." This function should be construed to specify the relationship that is connoted by a load being "associated with" a specific pump voltage.

The function should be construed to mean, "choosing a load based on the target pump voltage, such that the load is coupled to the output of the pumping circuit when the target pump voltage is selected." Subramanian Decl., ¶¶ 32-33. Specifically, the '241 patent explains that each load (such as Load A, B, or C, but not Load S) is "***associated***" with a specific pump voltage and that the load is attached to the output ***when that specific pump voltage is selected***. '241 patent, 4:33-51. In other words, the pump voltage is selected and then the load "associated" with that selected pump voltage is attached to the output. *Id.*, 4:33-51, 7:7-16, 7:31-42. This is further confirmed by the specification, which states that the recited function is for "select[ing] dynamically ***the best load*** for a pump ***as a function of the target output voltage***," which refers to the addition of the load in response to the selected pump voltage. *Id.*, 3:15-18 (emphasis added). This stands in contrast to Load S, which is not "associated" with a specific pump voltage value, but is added "whenever the maximum acceptable ripple on target output sampled" is greater than a reference voltage. *Id.*, 6:8-17, 7:7-16, 7:31-42; *see also id.,* Fig. 10 (describing a method where a desired voltage is selected and an associated load is connected before the pumping begins). Subramanian Decl., ¶ 33.

2. Structure

The specification identifies the three switches 320, 324, and 328 together with their respective control signals EN_A, EN_B, and EN_C and the controller that generates those signals as the structure that performs the recited function. Subramanian Decl., ¶ 34.

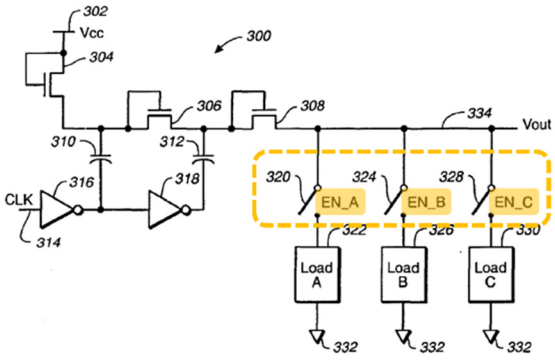


FIG._3

Specifically, the specification states, as illustrated in the image above, "[t]he three switches 320, 324, and 328 together with their respective control signals EN_A, EN_B, and EN_C form a load selector means that reduce voltage ripple at the charge pump output 334 to a minimum." *Id.*, 4:47-50; *see also id.*, 4:2-8 ("The charge pump circuit 300 includes several different loads 322, 326, and 330, each connectable via a respective switch 320, 324, 328 to the output 334 of the charge pump circuit. Depending on the desired pump output V_{out}, the switches select an appropriate load associated with a specific pump voltage to result in a minimum voltage ripple."). Likewise, the specification discusses "an EN_A switch 720 connected to a load A 722, an EN_B switch 724 connected to load B 726, and an EN_C switch 728 connected to a load C 730." *Id.*, 5:64-67. The specification also indicates that a controller generates the control signals: "When an instruction for either VA, VB, or VC is received by a controller (not shown), the controller (not shown) generates the enable control signal EN_A, EN_B or EN_C that selects an appropriate load for this voltage that gives the minimum voltage ripple." *Id.*, 4:52-56; *see also id.,* Fig. 10 (describing a method where a desired voltage is selected and an associated load is

connected before the pumping begins). The controller is necessary structure because, without it, the switches could not be selectively opened and closed based on specific output voltages, frustrating the goal of the claimed invention. Subramanian Decl., ¶¶ 34, 36.

Sonrai's inclusion of set load switch 716 and associated signal Set_load as the claimed structure is incorrect. Set load switch 716 and Set_load can be used any time the maximum acceptable ripple is greater than the reference voltage, thus it is not "a load associated with a specific pump voltage" as required by the recited function. *Id.*, ¶ 35.

F. "target output pump selector" (claim 2)

Defendants' Proposed Construction	Sonrai's Proposed Construction
Means-plus-function limitation. Function: "shutting down the variable charge pump circuit when the target output pump voltage (Vcfra) is greater than or equal to a reference voltage (Vref)" Corresponding structure: first comparator 702	Plain and ordinary meaning

The term "target output pump selector" should be construed as a means-plus-function limitation. Contrary to Sonrai's contention, the term has no plain and ordinary meaning in the field. *See* Ex. 5 (Sonrai's 11/3/21 Disclosure of Proposed Constructions), 9 (not identifying any extrinsic evidence to support a plain and ordinary meaning); Subramanian Decl., ¶ 39. Instead, in the context of claim 2, the term is defined by its recited function: "***shutting down the variable charge pump circuit***…." Importantly, the term does not connote sufficiently definite structure for performing the recited function. *SPH Am., LLC v. AT&T Mobility, LLC*, No. 3:13-CV-2318-CAB-KSC, 2015 WL 12831674, at *3 (S.D. Cal. June 9, 2015) (finding "selector" lacks sufficient definite structure and therefore is a means-plus-function term despite not reciting "means for"). This failure to "connote sufficiently definite structure" for performing the recited function necessitates applying the means-plus-function requirement to avoid impermissible

functional claiming. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1349 (2015) (finding claim term means-plus-function for failing to connote sufficiently definite structure, even when term does not use the word "means").

As a means-plus-function limitation, the corresponding structure for performing the recited function must be identified in the specification. Here, as shown in the annotated figure below, that structure would be comparator 702 (annotated in green), which disables the charge pump 100 when desired conditions are satisfied, and thus "shut[s] down the variable charge pump circuit." *See* '241 patent, 6:4-17, claim 2; Subramanian Decl., ¶ 40. Therefore, the corresponding structure for performing the claimed function is the first comparator 702.

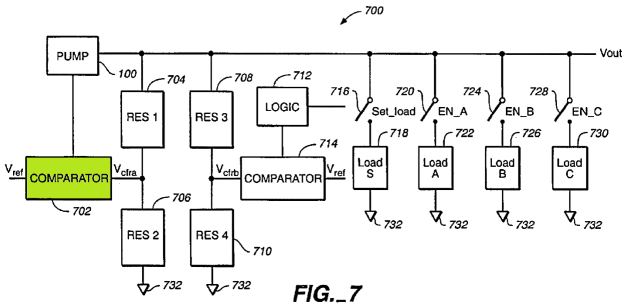


FIG._7

G. "target output selector means" (claim 3)

Defendants' Proposed Construction	Sonrai's Proposed Construction
Indefinite, or alternatively, means-plus-function limitation. If means-plus-function: Function: "adding a load, whenever a maximum ripple on the target output voltage (Vcfrb) greater than the reference voltage (Vref) then the maximum ripple on the target output selector means adds additional loads until the Vcfrb voltage is less than or equal to the reference voltage (Vref)" Corresponding structure: second comparator 714, logic circuit 712, resistor 708, resistor 710, and set load switch 716	"load selector means"

1. The Term "The Target Output Selector Means" Is Indefinite

The term "*the* target output selector means" appears in claim 3 without antecedent basis. Its use in claim 3 assumes the term has already been used, but neither claim 3, nor claims 1 and 2 (the claims from which it depends), recite an antecedent "target output selector means." Further, the specification does not use the term. Thus, the term is indefinite. *See Bushnell Hawthorne, LLC v. Cisco Sys., Inc.*, 813 Fed. Appx. 522, 527 (Fed. Cir. 2020) (term lacking antecedent basis is indefinite because a POSITA could not discern the term's meaning).

2. Alternatively, If Construed, The Term Should Be Construed As A Means-Plus-Function Limitation

Should the Court decide to construe the term, it should be construed as a means-plus-function limitation, as it is defined functionally and the word "means" creates a presumption that 35 U.S.C. § 112, ¶ 6 applies.[3] *See Personalized Media,* 161 F.3d at 703–04 (Fed. Cir. 1998).

As a means-plus-function limitation, the function recited in the claim is "adding a load, whenever a maximum ripple on the target output voltage (Vcfrb) greater than the reference voltage (Vref) then the maximum ripple on the target output selector means adds additional loads until the Vcfrb voltage is less than or equal to the reference voltage (Vref)." '241 patent, claim 3.

The structure corresponding to the recited function is limited to the structure in the specification that is necessary to perform that function. *See Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1352 (Fed. Cir. 2003). Here, that corresponding structure is shown below in the blue circle in annotated Figure 7. *See* '241 patent, col. 5:54-58 (stating Figure 7 shows the "selector means"). Specifically, resistors 708 and 710 form a voltage divider that creates the

[3] In addition, to the extent the Court disagrees with Defendants and finds that the "target output selector means" does have antecedent basis in claims 1 or 2, then such a finding would further strengthen Defendants' contention that claims 1 and 2 contain means-plus-function limitations.

node Vcfrb. Whenever the maximum acceptable ripple on that node is greater than the reference voltage (Vref), the second comparator 714 instructs the logic circuit 712 to "add the load S 718" with set load switch 716. *Id.*, 5:54-6:17, 7:56-64, claim 3; Subramanian Decl., ¶ 43; *see also id.,* Fig. 10 (describing a method where a load is added when voltage overshoots occur). Therefore, the corresponding structure is the two resistors 708 and 710, second comparator 714, logic circuit 712, and set load switch 716.

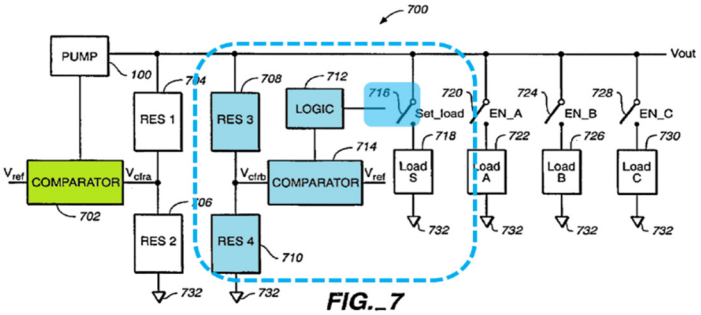


FIG._7

Sonrai's proposed construction is improper. Claim 3 expressly recites that the "load selector means" ***includes*** the "target output selector means." Simply construing the disputed term ***as*** "load selector means" makes little sense as claim 3 states that the load selector means "includes" the target output selector means and recites a function for the target output selector means that the structure for the load selector means does not perform.

H. "the output pump" (claims 6, 11)

Defendants' Proposed Construction	Sonrai's Proposed Construction
Indefinite	"the output of the pumping circuit"

The term "the output pump" in claims 6 and 11 is indefinite because it lacks proper antecedent basis. Sonrai does not dispute this, but instead tries to rewrite the disputed term. Sonrai's efforts contradict the plain language of the claim and should be rejected.

A claim is indefinite if it fails to inform, "with reasonable certainty, those skilled in the art about the scope of the invention." *See Bushnell Hawthorne, LLC v. Cisco Sys., Inc.*, 2020

WL 2488648, at *3-*4 (Fed. Cir. 2020). One way in which a claim fails to provide that reasonable certainty is when a claim term lacks antecedent basis. *Id.*; *see also Digital Retail Apps, Inc. v. H-E-B, LP,* 2020 WL 376664, n. 7 (W.D. Tex. Jan. 23, 2020) (finding claims are indefinite because the term "the purchase information" lacks an antecedent basis).

Here, dependent claim 6 recites "the first terminal of the switch being coupled to **the output pump**" and dependent claim 11 recites "the first terminal being coupled to **the output pump**." But neither those claims, nor the claims from which they depend, provide antecedent basis for "the output pump." This creates unresolvable ambiguity because claim 1 uses "pump" to refer to different circuits such as "a charge pump circuit" and a "pumping circuit." '241 patent, claim 1. The specification also fails to resolve the ambiguity because it explains that "[t]he charge pump circuit comprises … a load selector means coupled to the output pump," but fails to include "the output pump" in the list of components contained in the charge pump circuit, making it unclear which component or node should be used to satisfy the "coupled to the output pump" limitation. *See* '241 patent, Abstract; *id.*, 5:58-67 ("The charge pump circuit 700 includes a pumping circuit 100…, a first comparator 702 …," etc., but failing to include "the output pump."). Thus, the claims and specification fail to inform a POSITA with reasonable certainty whether "the output pump" is referring to the charge pump circuit as a whole, the pumping circuit within the charge pump circuit, or something else altogether.

Recognizing this fatal flaw, Sonrai attempts to rewrite the claim term as "the output of the pumping circuit." Sonrai's attempt at claim correction is improper because district courts can only correct a claim term if "(1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims." *See Novo Indus., L.P. v. Micro Molds Corp.*,

350 F.3d 1348, 1357 (Fed. Cir. 2003). Correction is improper here because, as noted, there is reasonable uncertainty over whether the term "the output pump" refers to the "charge pump circuit" of claim 1, the "pumping circuit" of claim 1, or a different structure. *See Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp.*, 93 F.3d 1572, 1579 (Fed. Cir. 1996) (different claim terms are presumed to have different meanings). As such, the term is indefinite.

IV. THE DISPUTED TERMS OF U.S. PATENT NO. 6,920,527

A. Overview of the '527 Patent

The '527 patent discloses a portable RAM drive that purports to be faster than prior art devices because it transfers data stored in non-volatile memory to volatile memory (i.e., RAM) when the drive is coupled to a computer system. '527 patent[4], Abstract. Prior art devices allegedly had drawbacks, such as small capacity and slow speed (e.g., floppy disks), or limited ability to modify data (e.g., compact discs). '527 patent, 1:15-23. Prior art portable media could also be relatively large and easily damaged, as in the case of floppy disks, CDs, or other non-volatile memory devices. '527 patent, 1:25-28.

To solve these problems, the '527 patent discloses a portable RAM drive comprising "a housing, a memory controller, a volatile memory, a non-volatile memory, and a connector to connect the portable RAM drive to the computer system." '527 patent, 1:42-45. The non-volatile memory stores data when the portable RAM drive is not connected to a computer system, and when connected, the data is transferred to the faster volatile memory for access by the computer system. '527 patent, 1:45-54. If the portable RAM drive is unplugged from the computer system, an internal power source powers the portable RAM drive long enough to transfer data from the volatile memory to the non-volatile memory. '527 patent, 1:54-58.

[4] The '527 patent is submitted as Ex. 3.

An embodiment of the portable RAM drive of the '527 patent is illustrated as element 103 in Figure 1 and includes a housing 104 and connector 105. '527 patent, 2:33-37. The portable RAM drive plugs into a connector 107 in laptop 101. '527 patent, 1:46-47.

B. Level of Ordinary Skill in the Art for the '527 Patent

A POSITA as of the filing date of the '527 Patent would have had a Bachelor's degree in electrical engineering or an equivalent field and two years of academic or industry experience working with the design of memory devices. Subramanian Decl., ¶ 48.

C. "portable memory apparatus" (claims 1, 15)[5]

Defendants' Proposed Construction	Sonrai's Proposed Construction
"an external data storage device for carrying data from one computer system to another computer system"	Plain and ordinary meaning

The term "portable memory apparatus" should be construed as it is used throughout the specification: "an external data storage device for carrying data from one computer system to another computer system." The '527 patent Background of Invention makes clear that "portability" refers to "allow[ing] a user to ***carry data from one computer system to another computer system***," for example to "allow a user to back up critical data from a computer hard drive." '527 patent, 1:10-15 (emphasis added). And all the examples of portable memory devices the patent provides (i.e., floppy disks, CDs, and memory sticks) are external memory devices. *Id.*, 1:15-17, 27-29; *see also* Figs. 1-3. Further, the '527 patent purports to solve a problem that stems from the fact that portable memory apparatuses are both external and carried from one computer system to another computer system: they are "easily damaged," for example when they are "dropp[ed]" or "scratch[ed]." '527 patent at 1:24-26.

[5] Although "portable memory apparatus" first appears in the preamble of claim 1, it is repeated throughout the dependent limitations and thus provides antecedent basis for the claims.

Moreover, one focus of the '527 patent is to maintain data integrity notwithstanding the fact that the portable memory apparatus is intended to be "unplugged from the computer system" when data transfer is complete. For example, "[i]f the portable RAM drive is unplugged from the computer system, an internal power source may power the portable RAM drive long enough to transfer the data." *Id.* 1:54-58; *see also id*. at claims 2-5, 17; 4:5-21. Alternatively, the portable memory apparatus may rely on "an indicator light, to indicate to a user that the portable RAM drive should not be unplugged from the computer system" or a "restraining device may be used to restrain the portable RAM drive to the computer system." *Id.* at 1:59-2:2; *see also id*. at claims 8, 19, 5:43-47; Figs. 3, 5. Finally, in the dependent claims, the patent recites familiar connectors that are used in such devices, like USB, FireWire, and serial ATA, as exemplary connectors for the invention. '527 patent, claim 10; 2:47-50, 3:48-51. Thus, "[t]he specification here, read as a whole, suggests that the very character of the invention requires" the ability to carry external data from one computer system to another.[6] *Micron Tech., Inc. v. North Star Innovations, Inc.*, 855 F. App'x 679, 684, 2021 WL 1750130, *3-*4 (Fed. Cir. 2021) (rejecting construction that "fail[ed] to accord with the objectives" of the invention).

D. "wherein, when said connector couples said portable memory apparatus to said computer system, said memory controller chip copies data from said non-volatile memory to said volatile memory, and said computer system accesses said data in said volatile memory through said connector" (claim 1)

Defendants' Proposed Construction	Sonrai's Proposed Construction
Indefinite	Plain and ordinary meaning

Claim 1 is indefinite because it impermissibly recites both an apparatus and a method of use of that apparatus. *IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1384 (Fed.

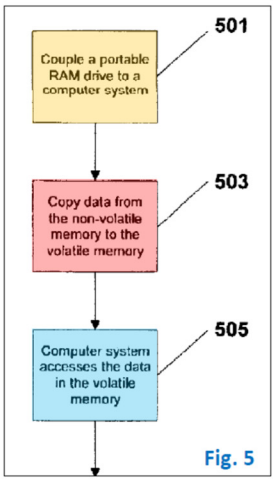
[6] This construction is also consistent with dictionary definitions in the relevant field. *See, e.g.*, Ex. 6, Microsoft Computer Dictionary, 5th Ed., 2002 ("**portable** *adj*….2. Light enough, rugged enough, and free enough of encumbering external connections to be carried by a user").

Cir. 2005) (finding mixed claims indefinite because "it is unclear whether infringement … occurs when one creates a system that allows the user to [use a feature of the system], or whether infringement occurs when the user actually uses [the feature]"); *In re Katz,* 639 F.3d 1303, 1318 (Fed. Cir. 2011). The claim is directed to "[a] portable memory apparatus," and its first five elements recite structural components of the claimed apparatus, *i.e.,* a housing, a memory controller, a volatile memory, a non-volatile memory, and a connector. '527 patent, claim 1, 6:21-32. However, the "wherein" clause of claim 1 improperly injects method steps into the apparatus claim, rendering it unclear when direct infringement would occur. *Id*., 6:33-38.

The "wherein" clause of claim 1 creates confusion by reciting a series of ordered steps that are performed by three different entities: the portable memory apparatus, the user, and the user's computer system. Subramanian Decl., ¶ 51. Indeed, as shown below, the "wherein" clause (left) recites the first three ordered steps 501, 503 and 505 of the "portable RAM drive process" illustrated in Figure 5 of the '527 patent (right). *Id.,* 2:18-19; *id.*, 3:29-46 ("FIG. 5 is a flowchart of one embodiment of a process [that includes] one or more of the steps" shown, and "additional steps may also be performed as desired."); *id.,* 3:47-4:27. Notably, the steps of accessing data and copying data are performed only after the ***user plugs*** the portable memory system into the user's computer system, as reflected in the "coupl[ing]" step (yellow). Subramanian Decl., ¶ 52; *see IPXL*, 430 F.3d 1384 (holding that a claim directed to a "system [including an input means] wherein . . . the ***user uses*** the input means" to be indefinite); *In re Katz,* 639 F.3d 1318 (holding claims directed to a system "with an interface means for providing automated voice messages" where certain "***callers*** digitally ***enter data***" to be indefinite).

Claim 1 – "wherein" clause

wherein, when said connector couples said portable memory apparatus to said computer system, said memory controller chip copies data from said non-volatile memory to said volatile memory, and said computer system accesses said data in said volatile memory through said connector.



In addition, the "access[ing] said data in said volatile memory" step (blue) is performed by a "computer system," such as a laptop, after the preparatory step of "copy[ing]" the data from non-volatile memory to volatile memory (red) occurs. *See* '527 patent, 4:22-27; *id.,* 3:37-38 ("said ***computer system accesses*** said data in said volatile memory through said connector."); *id.*, 2:33-41, Fig. 1 (showing portable memory apparatus separate from a laptop computer, and to be connected to it through a USB port). Significantly, this accessing step does not, and indeed cannot, recite the capability of the ***claimed portable memory apparatus***; rather, it claims an action independently undertaken by a ***different*** user device, i.e., the computer system. *See* Subramanian Decl., ¶ 53; *Ariba, Inc.* v. *Emptoris, Inc.*, 2008 WL 3482521, at *6-8 (E.D. Tex. Aug. 7, 2008) (holding that an apparatus claim directed to a "bidding device" is invalid because the claim recites a step performed by a different computer than the clamed "bidding device"), *aff'd,* 2010 WL 55625 (Fed. Cir. Jan. 8, 2010).

In short, the "wherein" clause fails to provide the reasonable certainty required by law. Its plain language makes clear that claim 1 is directed not only to a portable memory apparatus, but also impermissibly to the ***actions*** performed by that apparatus, a user (coupling the apparatus to the user's computer system), and the user's computer system itself (accessing data) when the

user uses the portable memory apparatus with the user's computer system. Subramanian Decl., ¶ 54. As such, the claim is indefinite. *IPXL*, 430 F.3d 1384; *In re Katz,* 639 F.3d 1318.

E. "when said connector couples said portable memory apparatus to said computer system, said memory controller chip copies data from said non-volatile memory to said volatile memory" (claim 1)

Defendants' Proposed Construction	Sonrai's Proposed Construction
"at the time the portable memory apparatus is connected to the computer system, said memory controller chip copies data from said non-volatile memory to said volatile memory"	Plain and ordinary meaning

The claim recites certain memory operation to take place *at the time that*[7] (i.e., "when") the portable memory apparatus is plugged in (or unplugged from) the host computer. *See* claim 1, '527 patent, 6:33-38 ("***when*** said connector couples said portable memory apparatus to said computer system*, said memory controller chip copies data from said non-volatile memory to said volatile memory*, and said computer system accesses said data in said volatile memory through said connector"); 2:37-41 ("the portable RAM drive 103 may store data on a non-volatile memory and *copy the data to a volatile memory* ***when*** *the portable RAM drive is coupled to a computer system*") (emphasis added). *Phillips v. AWH Corp.*, 415 F.3d at 1316.

The timing of the memory operation is relevant because it prepares the claimed portable memory apparatus for use. *See* '527 patent, 1:49-53, 3:40-4:27, Fig. 5. According to the claim, the computer system accesses only the *volatile* memory of the portable memory apparatus, and this volatile memory must first be populated with data from the non-volatile memory (where data is stored long-term) before it can be used. *See id.*

[7] *See, e.g.*, Ex. 7, Webster's II New College, 2001: "**when** (hwĕn, wĕn) *adv*…. 1. At what time … 2. At which time… --*conj*. 1. At the time that …"

F. "data" (claims 1, 15)

Defendants' Proposed Construction	Sonrai's Proposed Construction
"user data"	Plain and ordinary meaning

"The words of patent claims have the meaning and scope with which they are used in the specification and the prosecution history." *Kinik Co. v. Int'l Trade Comm'n*, 362 F.3d at 1365 (upholding a narrow construction of "mixture" based on the "scope given it in the specification," which made clear that "no broader scope was contemplated or intended.").

Here, the '527 patent makes clear that "data" refers to a user's data. Throughout the disclosure, the patent consistently uses data to refer to user data. *See* '527 patent, 4:22-27 ("At 505, *data* in the volatile memory may be accessed by the computer system *to be made available to the user.*") (emphasis added), 1:10-15 ("Portable storage mediums for computer systems may allow a *user* to carry data from one computer system to another computer system. Among other uses, portable storage mediums may allow *a user* to back up critical *data* from a computer hard drive.") (emphasis added), 4:12-21 ("The portable RAM drive may … alert a *user* if the portable RAM drive needs more time to transfer *data* back to the non-volatile memory from the volatile memory when the *user* is ready to unplug the portable RAM drive from the computer system.") (emphasis added).

As the specification makes clear, the claimed portable storage medium is directed to "allow[ing] a user" to carry or back up "data from one computer system to another computer system." *Id.*, 1:10-15. Because the consistent characterization of "data" throughout the patent shows that the proper scope of the term "data" is data that a user would seek to backup or transfer from a computer system, i.e., "user data," it would be improper to interpret data as including information that is inherent to the portable storage medium itself, such as system information. *See Wi-LAN USA, Inc. v. Apple Inc.*, 830 F.3d 1374, 1382 (Fed. Cir. 2016)

("Consistent use of a term in a particular way in the specification can inform the proper construction of that term.").

G. "wherein said memory controller chip transfers said non-volatile memory with data written to said volatile memory from said computer system while said portable memory apparatus is coupled to said computer system" (claim 6)

Defendants' Proposed Construction	Sonrai's Proposed Construction
Indefinite	Plain and ordinary meaning

Claim 6 is indefinite because it is open to at least two mutually exclusive interpretations. *California Inst. of Tech. v. Hughes Commc'ns Inc.*, 35 F. Supp. 3d 1176, 1181 (C.D. Cal. 2014) ("multiple equally plausible but materially dissimilar constructions of a claim term… fail the 'reasonable certainty' standard, even if none of the competing constructions are 'insolubly ambiguous.'"); *Nautilus, Inc.*, 572 U.S. at 910. The claim language "transfers said non-volatile memory with data written to said volatile memory from said computer system" does not inform a POSITA where data is being transferred from and where it is being transferred to. Sonrai rewrites the limitation by adding the prepositions "to" and "from" to the claim language and apparently reads this claim to mean that "the memory controller transfers data ***from*** the non-volatile memory ***to*** the volatile memory so that it can be accessed by the host computer." Ex. 8 (excerpt from '527 infringement contentions), 11. Another possible rewrite is to switch the prepositions to mean the opposite of what Sonrai said in its contentions, *i.e.*, that "the memory controller transfers data ***to*** the non-volatile memory ***from*** the volatile memory." *See, e.g.*, '527 patent claim 7 ("data stored in said volatile memory is being transferred to said non-volatile memory."). Because a POSITA would not know with reasonable certainty which of these exclusive interpretations might be correct, it is indefinite. Subramanian Decl., ¶¶ 57-58.

In addition, claim 6 suffers from the fact that it recites an impossibility—specifically, by its plain language, claim 6 requires that the "memory controller chip ***transfers said non-volatile memory***." (emphasis added). Non-volatile memory is a physical component of an apparatus and therefore cannot be "transferred" by a memory controller chip. *See* Subramanian Decl. at ¶ 56. Claims that require an impossibility are "indefinite as a matter of law under § 112, paragraph 2." *Synchronoss Techs. v. Dropbox, Inc.*, 987 F.3d 1358, 1366-67 (Fed. Cir. 2021) (claim requiring a "digital media file" to contain "a directory of digital media files" indefinite as "nonsensical" and requiring an impossibility); *Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1374 (Fed. Cir. 2004) ("Claims must be construed as they are written, not as the patentees wish they had written it.").

V. THE DISPUTED TERMS OF U.S. PATENT NO. 7,436,232

A. Overview of the '232 Patent

The '232 patent is directed to the field of clock signal distribution. '232 patent[8], 1:5-8. Clock signals control the timing of operations in synchronous systems. Clock signals must be accurately distributed to maintain adequate synchrony among components in the system. *Id.*, 1:13-18. However, clock signal distribution circuits have intrinsic resistance (R) and capacitance (C) that cause propagation delay of the clock signal. *Id.*, 1:21-35. The RC effect also distorts the signal waveform. *Id.*, 1:38-44; Fig. 1 illustrating original (102) and distorted (110) waveforms. Degraded clock signals can cause the system to malfunction. *Id.*, 1:16-18. The '232 patent admits prior art solutions to this problem were known, including to divide the clock distribution line into a plurality of shorter sections using repeater structures. *Id.*, 1:45-50. Nevertheless, each repeater segment will still have performance limits due to delay caused by the repeater structure. *Id.*,

[8] The '232 patent is submitted as Ex. 4.

1:56-63. Thus, per the '232 patent, distortion of the clock signal remained a significant problem. *Id.*, 2:14-21, *see also* comparison of Fig. 3A and 3B. The '232 patent purports to improve on such known solutions by "provid[ing a] repeater structure for a clock distribution line that reduces the total propagation delay compared to prior repeater structure." *Id.*, 2:38-40.

B. Level of Ordinary Skill in the Art for the '232 Patent

A POSITA as of the filing date of the '232 Patent would have had a bachelor's degree in electrical engineering or an equivalent field and two years of academic or industry experience working with the design of digital circuits.

C. "A method for regenerating a clock signal in a synchronous semiconductor memory, such method comprises the following steps" (claim 14)

Defendants' Proposed Construction	Sonrai's Proposed Construction
The preamble is not limiting except for "clock signal"	The preamble is limiting

In general, courts presume that language in the preamble does not limit the patent claim. *Allen Eng'g Corp. v. Bartell Indus., Inc.,* 299 F.3d 1336, 1346 (Fed. Cir. 2002). The presumption may be overcome if the preamble is necessary to give life, meaning and vitality to the claim as determined by the facts of each case. *Id.*; *see also Proveris*, 739 F.3d at 1372-1373. Exemplary guideposts for when the preamble should be construed as limiting includes whether the preamble: provides antecedent basis, is essential to understand limitations or terms in the claim body, recites additional structure or steps underscored as important by the specification, or is clearly relied upon during prosecution to distinguish over prior art. *Catalina,* 289 F. 3d at 808-809. By contrast, a preamble is not limiting "where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention," or where the language "merely extoll[s] benefits or features of the invention." *Id.*

The preamble does not further limit claim 14 because the body of the claim completely recites what the inventors considered to be their invention. This is illustrated in Fig. 5, which is "a schematic block diagram illustrating the general features of a regenerative clock repeater circuit ***in accord with the present invention***." '232 patent, 3:16-18 (emphasis added). The claimed method is practiced by this circuit when edge detector 500 receives a (degraded) clock signal (CK_{in}), ***detects*** its rise and fall edges, and then ***generates*** corresponding pull-up and pull-down control signals in response thereto. *Id.*, 3:34-48. These signals control the corresponding pull-up and pull-down transistors of output driver 706 to ***recover*** the high and low logical levels of the degraded clock signal and output the recovered clock (CK_{out}) onto the next segment of the clock distribution line. *Id.*, 3:48-59. Thus, the body of claim 14 (comprising the detecting, generating and recovering steps) fully defines what the patentees consider to be the complete inventive method, and the preamble language ("a method for regenerating a clock signal in a synchronous semiconductor memory") does no more than "state a purpose or intended use for the invention." Therefore, the entire preamble should not be limiting as Sonrai contends.

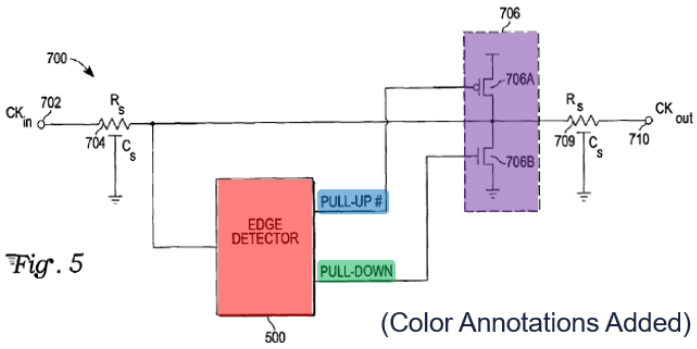


Fig. 5

(Color Annotations Added)

The *Catalina* guideposts further confirm the entire preamble should not limit the claim. The body of the claim is understandable without the preamble, and the preamble of claim 14 was not relied upon during prosecution to distinguish over prior art. *See generally* Ex. 9 (excerpt from '232 Prosecution History) (First Office Action dated Sept. 26, 2007 pages 4-5 allowing as-filed claim 15 that issued as claim 14). Further, unlike in *Vizio*, the specification offers no indication that the recited "synchronous semiconductor memory" structure is at all important or

otherwise essential to the claimed method. To the contrary, the only description illustrating how the purportedly inventive method may be used within a synchronous memory device is limited to a mere eleven lines of text (*see id.*, 5:64-6:7), after the patentees have finished explaining the claimed method using Figs. 5-8. *Id.*, 3:34-5:63 (without mentioning a synchronous memory device at all, and certainly without limiting the invention to clock signals in a synchronous memory device). Tellingly, instead of emphasizing the synchronous memory device as essential structure to the invention, the specification expressly notes that it merely "illustrates ***a typical use*** for the [inventive] clock repeaters in integrated circuitry." *Id.*, 5:67-6:1 (emphasis added). As the specification acknowledges, clock signals are not limited to synchronous memory devices since they are "essential" across ***all*** digital synchronous systems. *Id.*, 1:12-18.

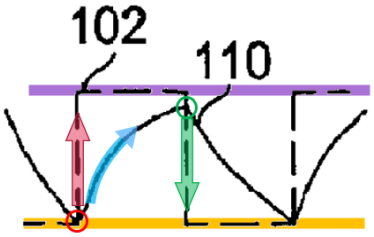
One *Catalina* guidepost that is relevant is the portion of the preamble ("clock signal") that provides antecedent basis for its appearance in the body of the claim. Therefore, Defendants agree that "clock signal" in the preamble is limiting. However, the fact that one portion of the preamble provides antecedent basis and is limiting "does not necessarily convert the entire preamble into a limitation, particular one that only states the intended use of the invention." *Tomtom, Inc. v. Adolph,* 790 F.3d 1315, 1323 (Fed. Cir. 2015). Unlike in *Bio-Rad*, the preamble of claim 14 is neatly packaged into two separate portions, with one portion simply reciting an intended use or purpose. *Bio-Rad* 967 F.3d at 1371. Here, the distinct portion reciting "in a synchronous semiconductor memory" merely states an intended use of the inventive method that is fully set forth in the body of the claim. As the specification concedes, using this method "in a synchronous semiconductor device" is not essential to the invention. Since deleting that portion of the preamble phrase would not affect the steps of the claimed invention, that portion should not be construed as a limitation to the claim. *Catalina*, 289 F. 3d at 809.

For the reasons set forth above, the Court should adopt Defendants' proposal and reject Sonrai's improper attempt to limit the claim to this statement of intended use.

D. "detecting a rise edge from a low logical level and a fall edge from a high logical level of said clock signal" (claim 14)

Defendants' Proposed Construction	Sonrai's Proposed Construction
detecting the clock signal passing above a low threshold voltage level set for the low logical level of the clock, and the clock signal passing below a high threshold voltage level set for the high logical level of the clock	Plain and ordinary meaning

This limitation captures what the '232 patent describes as its key inventive concept. As explained in the overview section *supra*, the '232 patent is directed to the field of distributing clock signals that become distorted due to intrinsic RC characteristics. The type of distortion the '232 patent purports to address is depicted in the following annotated version of Figure 1. The undistorted "reference" clock signal 102 has a square-shaped waveform (dashed black line) that alternates between a low logical level (orange line) and a high logical level (purple line) in time (horizontal axis). *Id.*, 1:18-26.



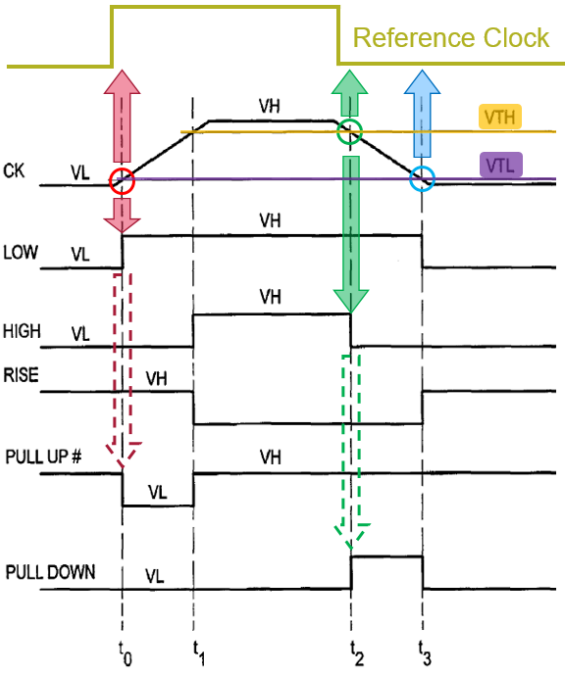
For clock signals, it is important that these transitions are sharp and occur quickly within a narrow and precise time window such that they can be relied upon by the rest of the system for controlling the timing of operations. As shown, reference signal 102 rises sharply (red arrow) and falls sharply (green arrow) as it transitions between these two levels. By contrast, the distortions result in clock signal 110 (solid black line) transitioning between these logical levels much more slowly. Even though both signals begin to rise at the same time (red circle), the depicted distortion causes signal 110 to rise so slowly (blue arrow) that it still has not yet reached the (purple) high logical level – even at the point in time (green circle) when the reference signal has begun to fall from the high logical level. Such distortions can lead to inadequate synchrony and system malfunction. *Id.*, 1:12-18.

According to the ’232 patent, the prior art approach for distributing clock signals relied upon detecting the clock signal crossing a single voltage threshold. *See id,* 2:31-33 (“In all of the approaches described above, the repeater structure needs the clock signal received at a repeater input to cross ***the threshold*** of the inverter in order to work.”) (emphasis added). This prior art approach, per the ’232 patent, is particular problematic for clock signals that have suffered significant distortions due to RC characteristics that are very high. *Id.*, 2:31-36. The patent explains that for such distorted clock signals (*e.g.*, as illustrated in Fig. 1), prior art clock repeaters relying on crossing a single threshold can only detect the slow-rising transition at a significantly delayed point in time (relative to when the undistorted reference signal has ***concluded*** its sharp-rising transition). *Id.*, 2:14-24 comparing clock signal delay Figs. 3A (undistorted) and 3B (distorted) as a function of the magnitude of the RC factor with the prior art single threshold set at the halfway point between the high and low logical levels. Thus, even though the prior art method can detect the transitions in the clock signal, the ’232 patent explains that it does so with inaccurate timing.

The’232 patent explains that its invention improved upon the prior art single threshold technique by detecting both a rise edge and a fall edge of the clock signal, thus overcoming problems associated with distributing clock signals with significant distortions. In order to “detect[] a rise edge … and a fall edge…”, the invention requires ***two*** voltage threshold levels – a low threshold level set near the low logical level of the clock (for “detecting a rise edge”), and a high threshold level set near the high logical level of the clock (for “detecting a fall edge”). *See id.,* 3:42-48 (“The pull-up control signal (PULL-UP#) is generated by ***a sensed rising edge of the clock signal passing above a low threshold voltage level***, the pull-down control signal (PULL-DOWN) is generated by ***a sensed falling edge of the clock signal passing below a high***

threshold voltage level.") (emphasis added). The specification illustrates how, in contrast to the prior art method, the inventive method uses "detecting a rise edge … and a fall edge" to regenerate a clock signal – even where the signal has suffered distortion such that the sharp transitions of the clock signal have become slow-rising "ramps." *See id.*, 5:6-12 and Fig. 8 (illustrating and describing degraded clock signal 800A as "a ***ramped waveform*** with relatively long rise and fall times ***instead of well-defined edge transitions***.") (emphases added).

The two-threshold solution is depicted with respect to Figure 8 (excerpted and reproduced below with annotations added). As shown, a ***first*** low threshold level "V_{TL}" (purple line) is used to detect a rise edge of the clock signal CK, and a ***second*** high threshold level "V_{TH}" (orange line) is used to detect a fall edge of CK. The specification explains that "[t]he high-threshold-level inverter (IVH) 540 detects clock transitions across the ***high-threshold level (V_{TH}) near the high logical level V_H***, while the low level inverter (IVL) detects clock transitions across the ***low-threshold line (V_{TL}) near the low logical level V_L***." *Id.*, 5:12-16 (emphases added).



As shown above, at the time (red circle) when distorted clock signal CK crosses above the low threshold level V_{TL}, the "LOW" signal transitions to high (downward red arrow). *Id.*, 4:30-35, 5:29-32. Importantly, by setting the low threshold level near the low logical level, it becomes possible to detect the signal transition in the distorted clock almost immediately after it begins its ascent, which more accurately corresponds to the point in time when the undistorted reference clock signal (solid gold line) transitions from

low-to-high (*compare* the timing of the rising transition in the gold line with the upward red arrow) as illustrated in annotated Fig. 8 above. *See also id.*, Fig. 1. The specification continues its explanation for how this LOW signal is used to generate a pull-up control signal (PULL_UP#) that also contains the same timing information (*see* dotted red arrow showing the temporal alignment of the two sharp transitions). *Id.*, 5:1-5. In turn, this generated pull-up control signal is used in the purportedly inventive method for recovering the low-to-high transition of the clock signal. *Id.*, 3:42-59, 5:16-21. Per the '232 patent, this is in sharp contrast to the prior art single threshold technique that does not detect a rise edge of the clock signal, and instead merely detects that a transition has occurred (albeit at a delayed point in time, *e.g.*, some time during the mid-point of the slow-rising ramp transition, as in Fig. 3B).

This distinction takes on even greater significance when we consider the rest of the claim phrase at issue that also recites "detecting … a fall edge from a high logical level." Here, the specification teaches that when clock signal CK crosses below the high threshold level V_{TH} (*see* green circle), the "HIGH" signal will transition to low at that time (*see* green arrow annotations)[9]. Importantly, this high threshold level (shown in Fig. 8 as being set near the high logical level V_H) is ***not at the same level*** as the low threshold level V_{TL} set for detecting the rise edge. This is a key inventive concept on which the '232 patent relies to distinguish the prior art technique. As the specification recognizes, just as the clock signal CK ramps ***up*** slowly, it also ramps ***down*** slowly due to the RC distortion. Thus, there is a significant delay between the point in time when the clock signal begins its fall from the high logical level to the point in time when

[9] Similar to the discussion above with respect to the LOW signal generating a pull-up control signal when the low threshold level is crossed, the HIGH signal is used to generate a pull-down control signal (PULL_DOWN) with the same timing information (*see* dotted green arrow showing temporal alignment). *Id.*, 5:1-5. The pull-down control signal, in turn, is used to recover the high-to-low transition of the clock signal. *Id.*, 3:42-59, 5:22-28.

it reaches and crosses the low threshold level (that was set near the low logical level for the purpose of quickly detecting the rise transition). *See* timing based on blue circle and blue arrow annotations and compare with the falling transition in the gold reference clock signal in annotated Fig. 8 *supra*. Indeed, using the same low threshold level here would introduce an even larger delay than if the level threshold is set at the mid-point instead.

The inadequacy of the admitted prior art, single-threshold technique is clear: if the (single) threshold is set at a level to accurately capture the timing of the ***rise*** transition, it would lead to large inaccuracies for the ***fall*** transition. Conversely, setting it at a level that can accurately capture the ***fall*** transition would lead to large inaccuracies for the ***rise*** transition. At best, one can accurately reproduce the timing of one or the other, but not both. However, using the method in '232 patent, a second threshold is independently set at a level that the distorted clock signal crosses as soon as it begins the descent, *i.e.*, near the high logical level. As a result, the point in time when the undistorted reference signal transitions from high-to-low (a falling transition) can likewise be captured. In this way, the '232 patent's method detects both (i) a rise edge from a low logical level, as well as (ii) a fall edge from a high logical level, thus requiring ***two*** threshold levels to be set – one for each respective logical level from which the signal transitions. Accordingly, when the claim recites "detecting a rise edge from a low logical level…of said clock signal," it is referring to detecting the clock signal passing above a low threshold voltage level (V_{TL}) set for the low logical level (V_L) of the clock. Similarly, when the claim recites, "detecting…a fall edge from a high logical level of said clock signal," it is referring to detecting the clock signal passing below a high threshold voltage level (V_{TH}) set for the high logical level (V_H) of the clock. This is precisely the meaning captured in defendants' construction. For the reasons set forth above, the Court should adopt defendants' construction.

Dated: December 23, 2021

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that on this 23rd day of December, 2021, all counsel of record who are deemed to have consented to electronic service are being serve with a copy of this document through email.

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